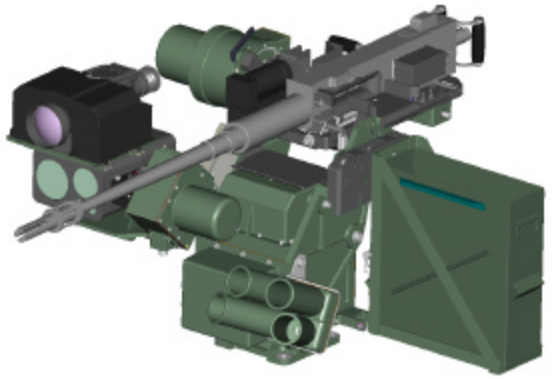
Common Remotely Operated Weapon Station (CROWS)

National Defense Industrial Association

SMALL ARMS SYSTEMS SYMPOSIUM

Atlantic City, NJ



15 May 2002

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Common Remotely Operated Weapon Station (CROWS)

Purpose

- To provide a technical description of CROWS
- To present initial results from testing performed at Aberdeen Proving Ground this year
- To summarize planned follow-on testing

Common Remotely Operated Weapon Station (CROWS)

OPM Small Arms Mission

- Management from 6.4 through Production for:
  - Individual and Crew Served Weapons
    - Pistols
    - Rifles
    - Carbines
    - Shotguns
    - Machine Guns
    - Grenade Launchers
  - Optics & Fire Control that are weapon mounted
  - Ammunition & Grenades; Lethal and Non-Lethal

- Oversight for Integration of all items that claim real estate on small arms platforms

OPM SA is the material developer for CROWS

Common Remotely Operated Weapon Station (CROWS)

Overview / Benefits

- Manufactured by Recon/Optical Inc., Barrington, IL
- Proponents: US Army Military Police School and US Air Force Security Forces Center
- Approved ORD Apr 99, projected FUE in late FY04
- Capable of serving as the primary or secondary armament system on a variety of vehicle platforms
  - Integrated and tested on UA HMMWV M1116
  - Efforts ongoing to integrate onto UA M1114 and Armored Security Vehicle (ASV) M1117
- Replaces the manual crew served vehicle mount or turret
  - Permits under armor/remote operation of existing crew served weapons for suppression of ground troops and engagement of light armor enemy vehicles
  - Allows for protection against enemy fire and munition fragmentation
- Increased survivability for gunners on lightly-armored platforms
- Increased lethality (ability to engage targets at greater distances with the initial burst)

CROWS on UA HMMWV M1116, USAF

ASV M1117, US ARMY

Common Remotely Operated Weapon Station (CROWS)

System Description

- Weapons supported
  - MK19 GMG
  - .50 Cal M2HB MG
  - M249 SAW
  - Planned weapon capability
    - M240B MG (by Sep 02)
  - Growth potential to other weapons
- Weapons can be interchanged, as required by the user
- Two axis stabilized mount enhances on the move target acquisition, tracking and engagement
- Ability to track targets independent of gun motion (in elevation)
- Electronic Fire Control System increases first round hit probability
- Sensor suite permits target engagement under day and night conditions at up to the maximum effective range of weapons

M240B, 7.62 mm Machine Gun

M249 Automatic Rifle/Light 5.56 mm Machine Gun

.50 Cal M2HB

MK19 40 mm GMG

Common Remotely Operated Weapon Station (CROWS)

System Characteristics

- Ammo ready round capacity:	Mk19-96, M2-300, M249-400
- Manual/emergency back-up operation	
- Programmable non firing zones in azimuth	
- Stabilized, allowing accurate fire on the move	
- Traverse	Continuous 360^{o}
- Range of Elevation	+ 60^{o} to -20^{o}
- Azimuth Rate (adjustable)	90^{o} /s
- Elevation Rate	60^{o} /s
- 2 Cradles (heavy and light)	
- Total Weight	< 450 lb
- Height to Top of Weapon	< 30 inches

Common Remotely Operated Weapon Station (CROWS)

Sensors

Day Sight

High-Performance, Extended Range Day Sensor

Identification range, vehicle	2,200 m
Field of View (zoom)	1.1º - 28.8º
Focal Length	256.5 - 9.5 mm
Magnification	0.5X to 8.5X

Night Sight

Heavy Thermal Weapon Sight (HTWS)

Recognition Range, Vehicle	2,200 m
Wide FOV	9º x 5.4º
Narrow FOV	3º x 1.8º
Spectral Range	3-5µm

Laser Range Finder

Determination of Vehicle Range:

5,000 m ± 10m

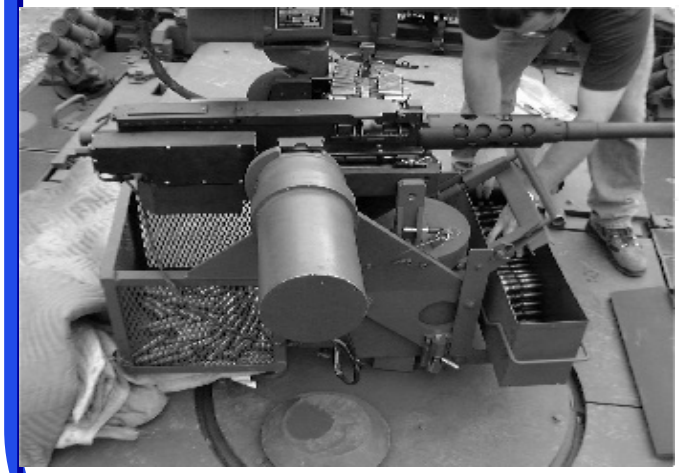
Common Remotely Operated Weapon Station (CROWS)

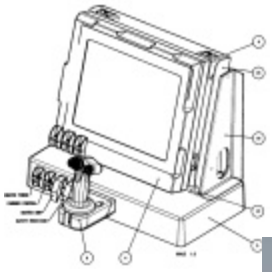
Vehicle Integration

Common Elements

EFCS Sensor w/ Day Sight, LRF & I2

Mount



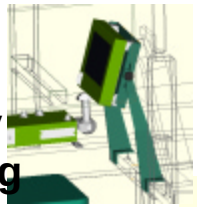


Operator interface

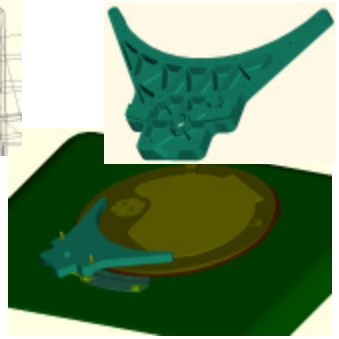
Removable Joystick

Vehicle Specific

Display Mounting



Cables



Mount Interface

Common Remotely Operated Weapon Station (CROWS)

Achieved Performance (CROWS on Hardstand)

GUN	STAB ON?	RANGE TO TGT (M)	ZERO RANGE (M)	# OF EVENTS	BURSTS PER EVENT	BURST SIZE (RDS)	# RDS PER EVENT	# OF RDS ON TARGET PER EVENT
M249	NO	800	800	10	1	10	10	8, 10, 9, 9, 9, 10, 10, 10, 10, 10
M2	NO	1000	1000	6	2	10	20	5, 1, 2, 1, 2, 1
MK19	NO	1000	1000	10	2	5	10	0, 2, 2, 3, 2, 0, 0, 2, 2, 1
M249	YES	800	800	6	1	10	10	9, 10, 10, 10, 10, 20
M2	YES	1000	1000	9	1	10	10	5, 5, 2, 6, 6, 4, 1, 1, 6
MK19	YES	1000	1000	5	2	5	10	2 HITS
M249	YES	800	300	5	1	10	10	9, 9, 8, 6, 8
M2	YES	1000	300	5	1	10	10	7, 4, 2, 3, 3
MK19	YES	1000	300	0	0	0	0	NONE FIRED

Demonstrated that with a good fire control, CROWS can provide good performance

Common Remotely Operated Weapon Station (CROWS)

Achieved Performance (Vehicle)

CROWS ON STATIONARY VEHICLE (TARGET SIZE 2.3M X 2.3M)

(M1116 UP ARMORED HMMWV)

GUN	STAB ON?	RANGE TO TGT (M)	ZERO RANGE (M)	# OF EVENTS	BURSTS PER EVENT	BURST SIZE (RDS)	# RDS PER EVENT	# OF RDS ON TARGET PER EVENT
M249	YES	800	800	7	1	10	10	9, 6, 6, 7, 8, 8, 6
M2	YES	1000	1000	5	1	10	10	1, 2, 3, 1, 1
MK19	YES	1000	1000	5	1	10	10	1, 2, 0, 2, 1

CROWS ON VEHICLE MOVING AT 15 MPH (TARGET SIZE 2M X 3M)

(M1116 UP ARMORED HMMWV MOVING OVER CROSS COUNTRY TERRAIN)

GUN	STAB ON?	RANGE TO TGT (M)	ZERO RANGE (M)	VEHICLE MOTION	# ROUNDS FIRED	3 ROUNDS ON TARGET
M249	NO	500	500	CLOSING	20	11
M249	NO	500	500	AWAY	10	5
M249	YES	500	500	CLOSING	50	22
M249	YES	500	500	AWAY	30	7

Common Remotely Operated Weapon Station (CROWS)

Additional Tests Performed

- Measurement of Dispersion
  - Hardstand/Vehicle
  - Stabilized/Un-stabilized
  - Different ranges
  - Hot, ambient and cold
- Environmental effects
  - Temperature
    - Hot (140 °F)
    - Cold (-25 °F)
  - Vibration
  - Shock
  - Rain

- **M249** - 800 rounds
  Zeroed at 300m,
  Fired at 850m, 8X8 target,
  90%+ hit rate

- **Mk-19** - 350 rounds
  Zeroed at 300m,
  Fired at 1000m,18X20 target,
  70%+ hit rate

- **M2HB** - 2000 rounds
  Zeroed at 300m,
  Fired at 1000m, 18X20 target,
  70%+ hit rate

- **All firing was off vehicle**

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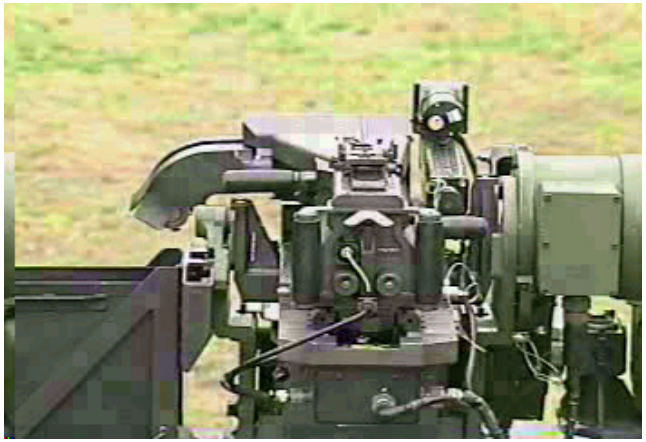
Videos from Live-fire Demo



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Planned Follow-on Tests

- Engineering tests (on-going)
  - Acquire additional data
  - Define system performance at longer ranges, under variety of moving scenarios and at temperature extremes
- ASV Integration (Jul 02)
  - Assess performance of CROWS on ASV platform under a variety of test conditions
- Developmental Testing (Oct 02)
  - 4 month duration
  - Formal testing to permit independent evaluator to assess system performance against COIC and ORD requirements
- Operational Testing (Jul 03)

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Summary

- CROWS:
  - provides the soldier with increased capability to acquire and engage targets
  - can be integrated onto a variety of vehicles
- Initial performance looks promising
- Testing continues to further define capabilities and identify areas for improvement